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ABSTRACT

Operant conditioning procedures were used in four studies to establish instruction following skills in severely and profoundly retarded children. In the first study, a combination of physical guidance, fading, and reinforcement procedures were used to train an 11-year-old boy to follow 25 verbal instructions. In the second study, a transfer of stimulus control procedure was invoked to train three children to follow the same instructions. Since no generalization occurred to untrained items in studies 1 and 2, a third study was undertaken with two Ss to determine whether being trained to follow instructions in which one verb was combined with several nouns would result in generalization when other verbs were combined with the same nouns. Ss of study 3 generalized to untrained items; however, there were some difficulties in establishing initial discriminations when training was initiated on the verb. In study 4, six Ss were trained on the individual noun and verb components in isolation. Two of the six Ss developed an intensive generative instruction following skill, three Ss developed a partial generative skill, and one S developed no generative abilities whatsoever. (GW)

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INSTRUCTION-FOLLOWING BEHAVIOR:

IT GENERALIZES

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ABSTRACT

Four studies concerned with establishing instruction-following skills in severely and profoundly retarded children were conducted. A multiple baseline across items design was used in all four studies. The subject in Study 1 was trained to follow instructions using a combination of physical guidance, fading, and reinforcement procedures. There was no generalization to untrained items. The subjects in Studies 2, 3 and 4 were trained using a transfer of stimulus control procedure. There was no generalization to untrained items in Study 2; however, extensive generalization occurred in Studies 3 and 4 in which different content items were used.

Friedlander (1970) stated that little attention has been paid to the young child as a listener or comprehender of spoken language. Even fewer attempts have been made to establish comprehension skills in the retarded (Whitman, Zakaras and Chardos, 1971). Comprehension seems essential for an individual:

1. to be a listener;
2. to follow instructions; and
3. may be a prerequisite to one's verbal output other than imitation (Fraser, Bellugi & Brown, 1963).

One comprehension skill which is easily defined is the ability to follow instructions. Instruction-following behavior can be defined as the ability to make the appropriate nonverbal motor response to a verbal message. In essence, motor behavior comes under the control of a verbal stimulus when an individual learns to follow instructions. Whitman, and associates (1971), using a combination of reinforcement, physical guidance, and fading procedures, were able to increase the instruction-following behavior of two retarded children. Increases occurred for both training and generalization items; however, it was unclear whether these increases were due to:

1. lack of motivation on the part of the subjects before training;
2. the subjects having learned specific response; or
3. to having responses come under the control of specific stimuli.

I am now going to summarize four studies concerned with establishing instruction-following skills, and with finding training procedures that result in generalization to untrained instructions.

There are some common elements to all four studies. They are:

1. each correct response was followed by praise and a backup reinforcer (Either edible or liquid);
2. an initial and final baseline were collected in each study;
3. during each session there were probes on items not yet trained;
4. an instruction was considered learned when correct responding occurred to the instruction
   (a) in isolation, and when
   (b) interspersed with other learned instructions;
5. all the subjects were either severely or profoundly retarded, were basically nonverbal, and had been trained on basic attending skills;
6. each subject was trained to imitate all behaviors involved as training and generalization items, this training occurred before the onset of the study;
7. a single subject multiple baseline across items design was used;
8. generalization items typically consisted of recombinations of components from training items. For example, push car and lift block are generalization items consisting of a recombination of the nouns and verbs of the training

items lift car and push block.

It is possible for generalization to occur to recombinations of verbs and nouns only after:

1. each noun, when verbally presented, controls a specific response which indicates recognition of the object mentioned;
2. each verb, when verbally presented, controls the action specified by the verb.

In the first study, Striefel and Wetherby (1973) replicated the Whitman, et al. study while controlling for the confounding factors. They used a combination of physical guidance, fading and reinforcement procedures to train an 11-year-old boy to follow 25 verbal instructions (See table 1). There was no generalization to untrained items. In addition, not all components of the verbal instructions controlled specific responses. Correct responding occurred on about 50% of the trails if:

1. nouns only were presented;
2. verbs only were presented; or if
3. complete instructions with the verb last were presented.

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Table 1 appears about here

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In the second study, Striefel, Bryan, and Aikens (1974) replicated Study 1. They used a transfer of stimulus control procedure to train three children to follow the same instructions used in Study 1. The transfer of stimulus control procedure consisted of:

1. presenting motor imitation trials until the child got three consecutive correct; then
2. presenting one trail in which the verbal instruction was followed by the trainer immediately modeling the behavior; and thereafter
3. presenting trials in which a delay occurred between the presentation of the verbal instruction and the modeling by the trainer. The delay increased after each correct response.

Eventually the subjects started to anticipate the expected response and responded to verbal instruction only.

Again no generalization occurred to untrained items. In addition, not all the components of the verbal instructions controlled correct responding. About 50% correct responding occurred when:

1. the verb was last;
2. the verb only was presented;
3. the noun only was presented.

Since no generalization occurred to untrained items in Studies 1 and 2, and since not all components of the instructions controlled the appropriate responses, it was decided that a different approach seemed essential if generalized instruction-following was to occur. The purpose of Study 3 (Striefel, Wetherby, & Karlan, 1974) was to determine whether being trained to follow instructions in which one verb was combined with several nouns would result in generalization when other verbs were combined with the same nouns.

There were two subjects. The training and generalization items consisted of all possible combinations of 12 verbs and 12 nouns or 144 items (See table 2).

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Table 2 appears about here

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The training procedure was the transfer of stimulus control procedure used in Study 2. In addition, during each session 12 probes were collected. The items probed rotated from session to session so that each of the 144 items was probed once every 12 sessions. Training was conducted by sequentially training all the items in row 1 (left to right), then row 2, and so on.

Figure 1 shows the number of verb-noun combinations for which training was necessary (open bars) for each successive verb for both Subjects 1 and 2. The remaining items (solid bars) were performed correctly without training. The asterisk indicates where a different trainer started working with the subject and the B indicates an item performed correctly during baseline. Subject 1 generalized to 78% of the combinations without training and Subject 2 generalized to 65% of items without training on those items.

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Figure 1 appears about here

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The results of Study 3 clearly show generalization to untrained items; however, there were some difficulties in establishing the initial discriminations when training was initiated on the second verb. Up to this point, the subject could perform one

action and he needed to attend only to the objects; however, at the point where training was initiated on the second verb he needed to attend to both the noun and the verb in order to perform correctly.

The purpose of Study 4 (Striefel, Roth, & Karlan, 1974) was to simplify the subject's task while determining whether generalization to verb-noun combinations would occur if the subjects were trained on the individual components (nouns and verbs) in isolation.

There were six subjects. The training items consisted of the 12 nouns and the 12 verbs used in Study 3, and the generalization items consisted of the 144 verb-noun combinations. The training procedure was the transfer of stimulus control procedure used in Studies 2 and 3. Again 12 daily probes were conducted. The subjects were first trained sequentially, one item at a time, to recognize any of the 12 objects that they did not know. Next the subjects were trained to perform the action specified by each of the verbs. Again items were trained one at a time.

Two subjects responded to most verb-noun instructions (90% or better), three responded to a small percentage (14 to 19%), and one subject basically responded to no verb-noun instructions. Thus one might conclude that two subjects had developed an intensive generative instruction-following skill, three had developed a partial generative skill, and one had developed no generative abilities whatsoever.

To conclude, let me summarize. I have presented the results of four instruction-following studies which indicate that:

1. some nonverbal severely and profoundly retarded children can be trained to follow instructions;
2. some training approaches will result in generalization to untrained items other approaches will not;
3. currently available procedures could probably be used in applied settings to provide some retarded children with some of the receptive skills needed in day-to-day living;
4. if receptive skills are a prerequisite to productive language (speech), then the procedures available now could be used to establish these prerequisites with at least some retarded persons.

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TABLE 1

TRAINING AND GENERALIZATION ITEMS

Training Items				Generalization Items
1.	*Stand up	14.	Blow on feather	1. Point to hair
2.	*Sit down	15.	Hold out scissors	2. Brush shoe
3.	*Brush hair	16.	Fold hands	3. Lift car
4.	Drink from glass	17.	Put on glove	4. Push block
5.	Raise your hand	18.	Wave your hand	5. Blow on Ball
6.	Clap your hands	19.	Rub cheek with washcloth	6. Drop feather
7.	Eat with spoon	20.	Point to ear	7. Wave scissors
8.	Drop ball	21.	Point to shoe	8. Hold out hand
9.	Push car	22.	Point to nose	9. Touch cheek
10.	Touch your knee	23.	Nod your head "yes"	10. Rub knee with washcloth
11.	Fold your arms	24.	Shake your head "no"	
12.	Lift block	25.	Stick out tongue	
13.	Open your mouth**			

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TABLE 2

TRAINING AND GENERALIZATION ITEMS

NOUNS

VERBS	1 GLASS	2 SCISSOR	3 CAR	4 SPOON	5 BALL	6 COMB	7 PLANE	8 GLOVE	9 FEATHER	10 BANANA	11 FORK	12 BLOCK
1. PUSH												
2. BLOW ON												
3. DROP												
4. POINT TO												
5. WAVE												
6. TAP												
7. POUND WITH												
8. SMELL												
9. ELEVATE												
10. HOLD OUT												
11. TURN												
12. ENCIRCLE												

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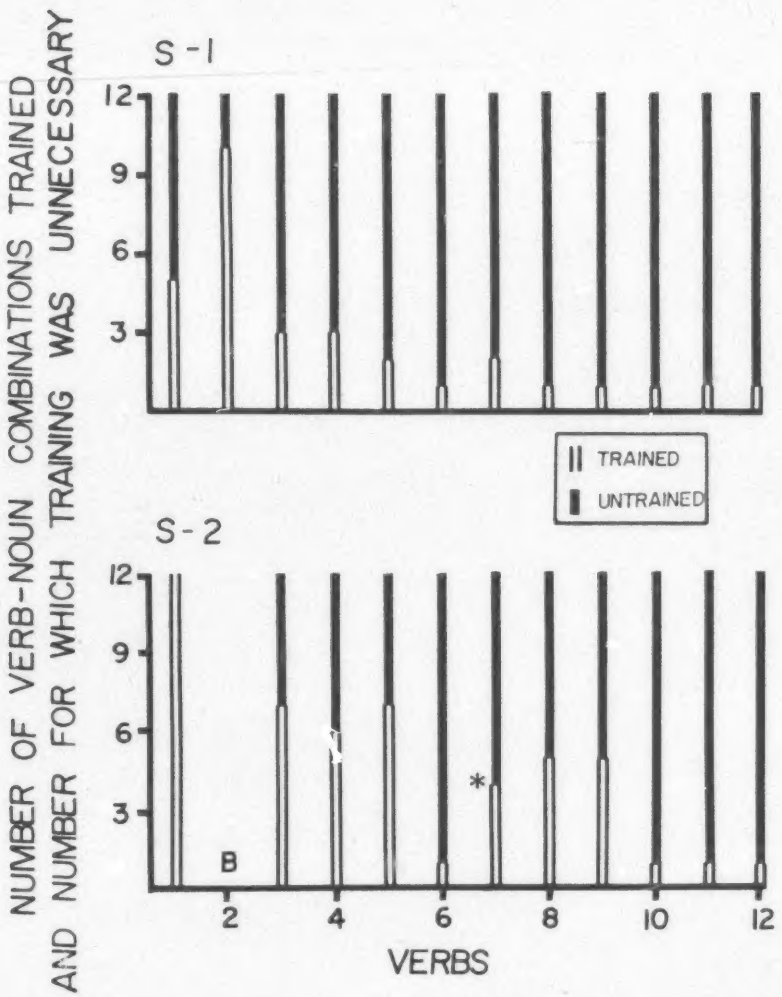

Figure 1. Number of nouns trained in combination with each verb and the number of verb-noun instructions to which generalization occurred. The B indicates verb-noun instructions which were not trained because the subject performed these instructions correctly on probes. The asterisk indicates the point at which different trainers started to work with Subject 2.